

Remarks/Arguments

Claim Rejections under 35 U.S.C. §103 (Obviousness)

The Examiner rejected Claims 2-7 and 9 under 35 USC §103 as being unpatentable over European Patent No. 0544181 (Niesporek) combined with United States Patent No. 5,488,886 (Mohr). Applicants respectfully traverse the rejection.

“To establish a *prima facie* case of obviousness three criteria must be met. First, there must be some suggestion or motivation to modify the reference. Second, the reference(s) must provide a reasonable expectation of success. Third, the reference or references must teach or suggest all limitations of the claim at issue. *The teaching or suggestion to make the combined combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure.*” *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added). Applicants contend that all the limitations of the rejected claims are not taught by the cited references. Furthermore, “[t]here are three possible sources of motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art.” *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). Applicants contend that there is no motivation to combine since the cited art is non-analogous, and the modification of Niesporek changes its principle of operation.

Niesporek and Mohr fail to teach a light barrier that can position a knife relative to a specimen to within a few microns or less that can cut specimens with a thickness that is 300 nanometers or less

It has been established that Niesporek fails to teach a light barrier that can facilitate the positioning of a knife in an ultramicrotome to within a few microns or less of a specimen. This is because Niesporek is not an ultramicrotome and Niesporek has no teaching of a light barrier. Mohr and a slew of other patents have been cited as the teaching reference for a light barrier, specifically, the interchangeability of a contact sensor for a light barrier. Applicants contend that

a light barrier used in an industrial machine (as disclosed in the references cited) that position structural elements on a mass scale on the order of inches and feet would not function in the ultramicrotome claimed. Claim 9 does not merely recite a light barrier for determining distance between a specimen and a knife, but recites a light barrier capable of determining distances of a few micrometers or less and that cuts specimen sections that 300 nanometers or less thick.

Mohr and the rest of the references that cite light barriers do not teach a light barrier or a cutting apparatus with that degree of accuracy. Niesporek can not make specimen cuts that are 300 nanometers or less thick, and the numerous references cited as teaching the interchangeability of a contact sensor and light barrier fail to teach a cutting apparatus that can make specimen cuts that are only 300 nanometers thick. The detection of a space of few micrometers or less between a knife and a specimen by a light barrier is also not taught by Niesporek, Mohr, or the others cited. Niesporek can not detect a spacing that small. The other references that have been cited as teaching a light barrier that can detect a space between a knife and a light barrier of only a few micrometers or less also fail to teach such an element. This accurate positioning and thin slice preparation is especially important in ultramicrotomes as opposed to merely a “normal” microtome since they tend to use diamond blades that can become damaged by even slight contact, or thick section cutting.

Moreover, the references cited as evidence of the efficacy of light barrier sensors within microtomes have nothing to do with the determining of distance between a specimen to be cut and the cutting surface. Pfeifer uses a light barrier as a safety on a manual microtome – no space determination. Sitte suggests that a light barrier can be used instead of a mechanical sensor for controlling a variable speed transmission, not distance determination between a cutting surface and a specimen. Walter discusses using a light barrier to determine rotational positioning of a disk, not linear distance and positioning between a cutting surface and a specimen. Therefore, the combination of Niesporek and Mohr (and the others cited) fail to teach the ultramicrotome recited in Claim 9.

Mohr and Niesporek fail to teach setting a cutting window automatically

Claims 16 and 19 recites that a cutting window in the ultramicrotome of Claims 9 and 18, respectively, is set automatically by for the apparatus by arranging the light barrier between the specimen and the knife to detect a position of the specimen during an up and down motion. Niesporek and Mohr (and the others) fail to teach an ultramicrotome that can set a cutting window for a cutting apparatus by detecting the up and down position of a specimen with a light barrier. Therefore, all the limitations of Claims 16 and 19 have not been taught and those claims are non-obvious.

Mohr and Niesporek fail to teach the detection of the point in time and the duration of a light barrier interruption and then the conveying of that information to a coding device to set the cutting window automatically

Claims 17 and 20 recite that the conveying of the moment and duration of the light barrier interruption to coding device is used to set the cutting window automatically in the ultramicrotome of Claims 9 and 18, respectively. Niesporek and Mohr (and the others) fail to teach an ultramicrotome that sets a cutting window by detecting the moment and duration of the interruption of a light barrier and sending that information to a coding device in an alternating drive system. Therefore, all the limitations of Claims 17 and 20 have not been taught and those claims are non-obvious.

Mohr and Niesporek fail to teach a ultramicrotome with a feed device and light barrier arrangement as recited in Claim 18

Claim 18 recites an ultramicrotome with a feed device “that generates motion in small steps that separates said knife and specimen after a first penetration of said light barrier in order to more accurately ascertain an interruption point of said light barrier.” Interruption of the light barrier not only stops motion of the feed device, but the feed device is designed to move the knife from the specimen in small steps to ascertain the light barrier interruption point. This movement requires a light barrier and feed device calibration that is not taught in either

Niesporek or Mohr, neither does the combination teach such an arrangement. Thus, the combination of Niesporek and Mohr fails to teach all the limitations of Claim 18 and a *prima facie* case of obvious has not been established for Claim 18.

Mohr is not analogous to Niesporek or the present invention

Before an Examiner can rely on a reference as a basis for an obviousness rejection “the reference must either be in the field of the applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned.” In re Oetiker. 977 F.2d 1443 (Fed. Cir. 1986). The Examiner cited Mohr to support a motivation to replace a contact sensor with a light barrier. **Mohr is not even remotely related to the field of endeavor of Applicants’ invention.** Mohr teaches a hydraulic, guillotine, bench cutting machine for cutting sheets of material stacked on a bench (Abstract and Figure 1). That is, Mohr is cutting a plurality of longitudinal sheets orthogonal to the face/surface of the sheets. Specifically Mohr teaches cutting stacked sheets of paper, cardboard, or similar material (col. 5, lines 39-41). The present invention addresses slicing of a specimen in an ultramicrotome. In addition to the difference in cutting operations (chopping sheets versus slicing a cross section from a piece), there are orders of magnitude difference between the stack materials cut by Mohr and the slices produced by the present invention. For example, **the slices in the present invention are 300 nanometers or less.** Contrarily, **Mohr’s stacks are typically measured in feet and inches.** In addition, the problem solved by Applicants’ use of a light barrier is preventing damage to a ultramicrotome knife or the specimen being cut, as well as increasing the precision of the cutting action of the ultramicrotome. Mohr has no interest in preventing damage to the cutting mechanism or the sample being cut. **Mohr also does not offer motivation to use a light barrier to increase the precision of the cutting action in an ultramicrotome.** In the interview with Examiner Peterson on November 14, 2005 the Examiner was adamant that Figure 6 in Mohr was adequate motivation to render obvious the light barrier application of the present claims, and the most recent Office Action stresses this point by citing a litany of references that are cited as motivation to exchange a light barrier for a contact sensor. What Applicants think has been

overlooked by Examiner is that one of ordinary skill in the art would not be motivated to combine Mohr since the industrial application of the light barrier in Mohr (and the others cited) has no relation to the ultramicrotome of the present invention. Mohr and the present invention are non-analogous since they are from different fields and they are solving different problems.

Modification of Niesporek changes its principle of operation

The Examiner has stated that it would have been obvious to one of ordinary skill in the art to have modified Niesporek by replacing his contact sensor with a light barrier. The Examiner proposes a modification that eliminates the contact sensor utilized in Niesporek in exchange for a light sensor utilized in Mohr. This proposed modification is not proper to support a *prima facie* case of obviousness because it is improper to suggest a “modification or combination of references [that] would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate.” *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959), MPEP §2143.01. A primary principle that Niesporek teaches is the requirement that the sensor be in contact with the specimen to determine the stopping point of the course movement. **By eliminating the contact sensor, the primary reference, Niesporek, is now devoid of the basic principle upon which it operates. Substantial reconstruction of a primary reference in this manner cannot create a sufficient basis to render claims as *prima facie* obvious.** 270 F.2d 810. Contact between the specimen and the contact sensor is the principle of operation of the Niesporek invention, and since removing this feature from Niesporek would require a change in the basic principle under which Niesporek operates, the modification cannot render Applicant’s claims obvious.

Motivation to modify Niesporek was influenced by impermissible hindsight

In issuing the rejection of the claims of the instant application the Examiner has used impermissible hindsight in combining the teachings of Niesporek with Mohr (and others) to reject Applicant’s claims due to obviousness. References must be viewed without the benefit of

impermissible hindsight afforded by the claimed invention. MPEP §2141. The Examiner has in his rejection benefited from the teachings in the instant application in arriving at the determination that the claimed invention is obvious in light of the Niesporek. Without the disclosure offered by the Applicants the Examiner would have been incapable of coming to the conclusion that the instant application is obvious.

The Examiner has cited a laundry list of patents that supposedly provide the motivation to modify Niesporek to replace the limiting device of Niesporek with a light barrier. In reaching that conclusion the Examiner points out that one of ordinary skill in the art would replace a contact sensor with a light barrier to reduce the potential for breakage, and also mentions that the two sensors are art-recognized equivalents. Assuming *arguendo* that one of ordinary skill in the art would replace a contact sensor with a light barrier, to reduce the potential for breakage, such a motivation lacks credibility. Although the motivation does not have to match the applicant's motivation to support an obviousness rejection, certain motivations are nothing more than an afterthought to support an invalid obviousness rejection. One of ordinary skill in the art of ultramicrotome technology, such as Applicants, would not be searching for a sensor that would be less prone to breaking, but would be searching for a sensor that could increase the accuracy of measuring the distance between the specimen and the knife to prevent damage to the knife and specimen. Durability of the sensor would not be a concern to one of ordinary skill in the field of ultramicrotomes since contact between sensor and a diamond blade as used in ultramicrotomes would destroy the blade. The fact that Niesporek used a contact sensor on a microtome despite evidence that light sensors were available rejects the Examiner's contention that one of ordinary skill in the art would replace a contact sensor a light barrier. Thus, the Examiner's assertion that one of ordinary skill in the art would deem the use of a light barrier in place of a contact sensor is an afterthought used to support a rejection based on impermissible hindsight.

The Examiner is also incorrect in declaring that one of ordinary skill in the art would consider using a light barrier over a contact sensor because the two sensors are art-recognized equivalents. Relying on equivalence as a rationale to support an obviousness rejection requires that the equivalency be art recognized. MPEP §2144.06. Stating that two components are art-

recognized equivalents sets the stage for offering evidence of equivalency, but more is needed than a mere assertion. The Examiner has merely made a blanket claim that contact sensors and light barriers are art-recognized equivalents with no justification for this statement. Equivalency cannot be “based on applicant’s disclosure or the mere fact that the components at issue are functional or mechanical equivalents.” MPEP §2144.06, *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). The Examiner has cited references that state that the contact sensor disclosed could be replaced with a light barrier, but in every instance that such a swap is suggested the operation that the sensor was implemented for had nothing to do with sensing a spacing between a blade and a specimen to be cut. Considering that the Examiner has failed to reference any relevant support for the assertion that the sensors are art-recognized equivalents, it can only be assumed that equivalency in this instance has been based on Applicant’s disclosure, and thus the obviousness rejection based on this statement is in error. The laundry list of patents cited as evidence that contact sensors and light sensors are art recognized equivalents all come from industrial machines used to move or cut large scale items such as apparatus for bobbins and bobbin sleeves in a textile plant, system for wrapping large objects, device for emptying refuse containers, etc. The field of industrial equipment does not use a light sensor to increase accuracy of a cutting motion, especially to the degree now claimed, i.e., in the range of a micron or less. Instead, the references, all from industrial applications of light barriers, all teach uses the light barrier to increase the longevity of a machine. Not a single reference cited speaks to the applicability of an industrial light source that measures and positions a cutting device to a micron or less from the substance to be cut.

There was also no motivation to alter Niesporek in light of the long reliance on contact sensors. Contact sensors in microtomes have been the mainstay for determining the positioning of the knife relative to the specimen to be cut. The limiting device in Niesporek is a movable plate linked to a microswitch, i.e., a contact sensor. A specimen is moved toward this plate until switching point of the microswitch is reached, causing the progression of the specimen toward the knife to halt. That is remarkable considering the longstanding problems associated with

microtomes that use contact sensors to determine distance between a specimen and a knife.

Those problems include:

1) The specimen contacts the plate leading to possible contamination of the specimen and the knife.

2) The microswitch does not have the requisite repeatability in the micrometer range.

3) The limiting device only positions the specimen to a predetermined point.

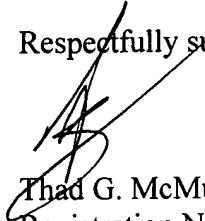
Consequently, despite the longstanding problems associated with using contact sensors in microtomes there was no change to the light barrier that the Examiner has indicated would have been an obvious modification of Niesporek. Despite ample opportunity to solve the inherent problems in cutting samples with a microtome that are solved by the instant application, i.e., preventing specimen damage and contamination, and improving the precision of the microtome, there have been no attempts to implement a light barrier sensing device on a microtome until the Applicants invented the apparatus of the instant application. Thus, the Examiner's cited motivation to combine Niesporek with Mohr (or the others) looks more like a motivation born out of impermissible hindsight reconstruction.

For all the reasons presented above, Niesporek fails to form a *prima facie* case of obviousness with respect to Claims 9 and 18. Therefore, Claims 9 and 18 are patentable over Niesporek. Claims 2-7 & 16-17, dependent from Claim 9, enjoy the same distinction over the cited prior art. Claims 19-20, dependent on Claim 18, enjoy the same distinction over the cited art. The rejection of Claims 2-7, 9 & 16-20 should be removed.

Conclusion

Applicant respectfully submits that all pending claims are now in condition for allowance, which action is courteously requested.

Respectfully submitted,



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